PATENT ABSTRACTS OF JAPAN

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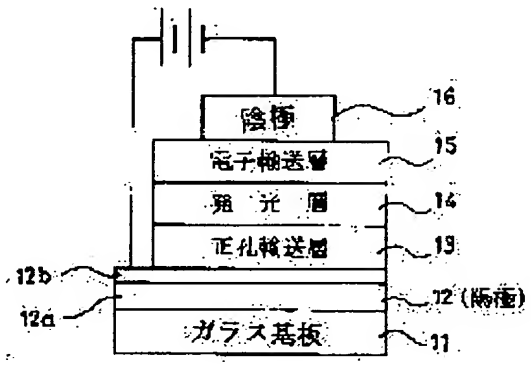
(54) ORGANIC LIGHT-EMITTING ELEMENT

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an organic light-emitting element which solves the problems of short circuit and dark spots caused by local protrusions of transparent conductive films of an anode.
SOLUTION: This organic light-emitting element has the anode 12, having the two-layer constitution by respectively forming the polycrystalline transparent conductive film 12a on the surface of a glass substrate 11, and the amorphous transparent conductive film 12b on the film 12a.



LEGAL STATUS

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[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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CLAIMS

[Claim(s)]
[Claim 1] The organic light emitting device characterized by to equip a transparence substrate side with the anode plate of the two-layer configuration which carried out film formation of the transparent conductive film amorphous on it for the transparent conductive film of polycrystal respectively in the organic light emitting device which consists of cathode which carried out membrane formation formation on the organic layer which the transparence substrate side was made to deposit the anode plate of the transparence which carried out membrane formation formation, and on this anode plate film, and this organic layer.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the organic light emitting device equipped with the luminous layer which consists of organic material.
[0002]
[Description of the Prior Art] Drawing 3 is the simple block diagram showing an example of an organic light emitting device. This organic light emitting device carries out film formation of the electron hole transportation layer 13, a luminous layer 14, and the electronic transportation layer 15 one by one on the transparent glass substrate 11 which carried out film formation of the anode plate 12, and has further structure which carried out film formation of the cathode 16 at the electronic transportation layer 15 so that it may illustrate. In addition, a glass substrate 11 has some which were formed by transparent plastics material.
[0003] The anode plate 12 is formed with the large metal and large alloy of a work function. Specifically, it is the transparent conductive film of the polycrystal formed using ITO (oxide of indium-tin), SnO2 (tin oxide), ZnO (zinc oxide), etc.
[0004] Moreover, film formation of the electron hole transportation layer 13, a luminous layer 14, and the electronic transportation layer 15 is carried out by organic material (organic compound). The macromolecule system material specifically represented with the low-molecular system material represented by Alq3 (aluminum chelate complex) and TPD (aromatic series diamine) or a PPV (polyphenylene vinylene) derivative is used.
[0005] The above-mentioned cathode 16 is formed with the mixture of a metal and an alloy with work-related [small], or a these metals and an alloy. Specifically, it is the cathode which carried out thin film formation of calcium (calcium), aluminum (aluminum), an aluminum-Li (lithium) alloy, a Mg (magnesium)-Ag (silver) alloy, a Mg-aluminum alloy, the Mg-In (indium) alloy, etc. by approaches, such as vacuum evaporationo and sputtering.
[0006] When the above-mentioned organic light emitting device impresses direct current voltage to an anode plate 12 and cathode 16, the electron hole poured in from an anode plate 12 is sent to a luminous layer 14 through the electron hole transportation layer 13. Moreover, the electron poured in from cathode 16 is sent to a luminous layer 14 through the electronic transportation layer 15. In a luminous layer 14, an electron hole and an electron recombine, by this, the organic material of a luminous layer 14 will be in an excitation state, and an exciton generates.
[0007] Thus, the generated exciton diffuses the inside of a luminous layer 14, deexcitation is carried out continuously to that ground state, light is then emitted, and this luminescence is injected through the electron hole transportation layer 13, an anode plate 12, and a glass substrate 11.
[0008] Drawing 4 is the simple block diagram of the organic light emitting device constituted so that a luminous layer 14 might serve as the electronic transportation layer 15. As for this light emitting device, film formation of the anode plate 12 is carried out at a glass substrate 11, the laminating of the electron hole transportation layer 13 and the luminous layer 14 is carried out on it, and film formation of the

cathode 16 is carried out at the luminous layer 14.
[0009] Drawing 5 is a simple block diagram of an organic light emitting device with which a luminous layer 14 serves as the electron hole transportation layer 13. As for this light emitting device, film formation of the anode plate 12 is carried out at a glass substrate 11, the laminating of a luminous layer 14 and the electronic transportation layer 15 is carried out on it, and film formation of the cathode 16 is carried out at the electronic transportation layer 15.
[0010] Drawing 6 is the simple block diagram of the organic light emitting device which is not equipped with the electron hole transportation layer 13 and the electronic transportation layer 15. As for this light emitting device, film formation of the anode plate 12 is carried out at a glass substrate 11, the laminating of the luminous layer 14 is carried out on it, and film formation of the cathode 16 is carried out at the luminous layer 14.
[0011] The organic light emitting device shown in drawing 4 , drawing 5 , and drawing 6 emits light by impressing direct current voltage to an anode plate 12 and cathode 16 like the organic light emitting device shown in drawing 3 , and this luminescence injects it through an anode plate 12 and a glass substrate 11.
[0012] The luminescent color of the above-mentioned conventional organic light emitting device has a large place depending on the organic material of a luminous layer 14. In current, the organic light emitting device of green, yellow, orange, red, and the blue luminescent color is put in practical use and proposed.
[0013]
[Problem(s) to be Solved by the Invention] As shown in drawing 7 , on the field of a glass substrate 11, patterning of the transparent conductive film of polycrystal is carried out after membrane formation and to an electrode configuration according to vacuum membrane formation or wet process, and thin film formation of the anode plate 12 of the above-mentioned organic light emitting device is carried out.
[0014] Therefore, when carrying out membrane formation formation of the anode plate 12 using ITO of polycrystal, partial growth of crystal grain (grain) arises like a film formation fault, and local upheaval (many projecting parts of irregular arrangement) of a crystal arises on a film surface.
[0015] Since magnitude (height) becomes 1500A or more, this local upheaval comes to break through the organic layer (an electron hole transportation layer or luminous layer) made to deposit on an anode plate 12. For this reason, the defect resulting from short-circuit or dark spot (non-light-emitting part) growth arises in a light emitting device.
[0016] Moreover, if an organic layer is formed thickly and all local upheaval on an anode plate 12 tends to be covered, since the luminescence starting potential of an organic light emitting device will rise, the problem said that a light emitting device property falls arises.
[0017] This invention aims at proposing the organic light emitting device which solved problems generated by local upheaval of the conductive film of an anode plate, such as short-circuit and a dark spot, in view of the above-mentioned actual condition.
[0018]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, in this invention, it is related with the organic light emitting device which consists of cathode which carried out membrane formation formation on the organic layer which the transparence substrate side was made to deposit the anode plate of the transparence which carried out membrane formation formation, and on this anode plate film, and this organic layer.
[0019] And it has been the description that the organic light emitting device of this invention equipped the transparence substrate side with the anode plate of the two-layer configuration which carried out film formation of the transparent conductive film amorphous on it for the transparent conductive film of polycrystal respectively.
[0020]
[Function] Thus, the anode plate of the constituted organic light emitting device is covered with the transparent conductive film with the amorphous local upheaval generated on the transparent conductive film of polycrystal. Moreover, granular growth does not arise and the amorphous transparent conductive

film serves as a uniform and flat film surface.
[0021] Consequently, since the organic layer deposited on the anode plate film is formed on the amorphous transparent conductive film, an organic layer is not broken through by the granular local upheaval produced on the anode plate film. It becomes an organic light emitting device without the short-circuit resulting from local upheaval of the anode plate film, or a dark spot from this.
[0022]
[Embodiment of the Invention] Next, 1 operation gestalt of this invention is explained along with a drawing. Drawing 1 is the simple block diagram showing the organic light emitting device of this operation gestalt. As for this organic light emitting device, everything but an anode plate configuration has an organic light emitting device of the conventional example shown in drawing 3 , and this composition so that it may illustrate.
[0023] And as shown in drawing 2 , membrane formation formation of the transparent conductive film 12a of polycrystal is carried out as the 1st layer of an anode plate on the field of the transparent glass substrate (or transparent plastic plate) 11, membrane formation formation of the still more nearly amorphous transparent conductive film 12b as the 2nd layer of an anode plate is carried out, and the transparent conductive film 12a and 12b of these two-layer configuration constitutes the anode plate 12 from this operation gestalt.
[0024] Moreover, transparent conductive film 12a of polycrystal carries out thin film formation at 1000A using ITO material, and using IXO (trade name of Idemitsu Kosan, Inc.), 500A - 1000A amorphous transparent conductive film 12b is deposited, and has carried out film formation. IXO is In2O3-ZnO system amorphous transparence electric conduction material.
[0025] In addition, patterning of these transparent conductive film 12a and 12b is carried out to an electrode configuration after membrane formation according to vacuum membrane formation or wet process.
[0026] Since the local upheaval which generates the anode plate 12 formed as mentioned above in transparent conductive film 12a in a film formation process is covered with transparent conductive film 12b, it serves as a uniform flat film surface according [the front face of an anode plate 12] to transparent conductive film 12b.
[0027] Therefore, since the electron hole transportation layer 13 can be made to deposit on the flat film surface of amorphous transparent conductive film 12b, it breaks through in the electron hole transportation layer 13, and a part does not arise.
[0028] Thus, since it had the anode plate 12 constituted using the advantage of transparent conductive film 12a of the small polycrystal of specific resistance, and amorphous transparent conductive film 12b which does not produce local upheaval although specific resistance is larger than this transparent conductive film 12a, it becomes an organic light emitting device without the short-circuit and generating of a dark spot resulting from local upheaval of an anode plate 12.
[0029] As mentioned above, although 1 operation gestalt of this invention was explained, transparent conductive film 12a can be formed by the other ZnO(s) material of ITO material, SnO2 material, etc., and transparent conductive film 12b can be formed not only by IXO but by the same amorphous material.
[0030] Furthermore, the anode plate 12 of the above-mentioned operation gestalt can be similarly carried out about the organic light emitting device shown in drawing 4 , drawing 5 , and drawing 6 as a conventional example.
[0031]
[Effect of the Invention] Since the organic light emitting device of this invention was equipped with the anode plate considered as the two-layer film configuration by the transparent conductive film of polycrystal, and the amorphous transparent conductive film, it turns into a good organic light emitting device without short-circuit or a dark spot, as described above.

[Translation done.]

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TECHNICAL FIELD

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PRIOR ART

[Description of the Prior Art] Drawing 3 is the simple block diagram showing an example of an organic light emitting device. This organic light emitting device carries out film formation of the electron hole transportation layer 13, a luminous layer 14, and the electronic transportation layer 15 one by one on the transparent glass substrate 11 which carried out film formation of the anode plate 12, and has further structure which carried out film formation of the cathode 16 at the electronic transportation layer 15 so that it may illustrate. In addition, a glass substrate 11 has some which were formed by transparent plastics material.
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[0007] Thus, the generated exciton diffuses the inside of a luminous layer 14, deexcitation is carried out continuously to that ground state, light is then emitted, and this luminescence is injected through the electron hole transportation layer 13, an anode plate 12, and a glass substrate 11.
[0008] Drawing 4 is the simple block diagram of the organic light emitting device constituted so that a luminous layer 14 might serve as the electronic transportation layer 15. As for this light emitting device, film formation of the anode plate 12 is carried out at a glass substrate 11, the laminating of the electron hole transportation layer 13 and the luminous layer 14 is carried out on it, and film formation of the cathode 16 is carried out at the luminous layer 14.
[0009] Drawing 5 is a simple block diagram of an organic light emitting device with which a luminous layer 14 serves as the electron hole transportation layer 13. As for this light emitting device, film formation of the anode plate 12 is carried out at a glass substrate 11, the laminating of a luminous layer 14 and the electronic transportation layer 15 is carried out on it, and film formation of the cathode 16 is

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[0010] Drawing 6 is the simple block diagram of the organic light emitting device which is not equipped with the electron hole transportation layer 13 and the electronic transportation layer 15. As for this light emitting device, film formation of the anode plate 12 is carried out at a glass substrate 11, the laminating of the luminous layer 14 is carried out on it, and film formation of the cathode 16 is carried out at the luminous layer 14.
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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] As shown in drawing 7 , on the field of a glass substrate 11, patterning of the transparent conductive film of polycrystal is carried out after membrane formation and to an electrode configuration according to vacuum membrane formation or wet process, and thin film formation of the anode plate 12 of the above-mentioned organic light emitting device is carried out.
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MEANS

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OPERATION

[Function] Thus, the anode plate of the constituted organic light emitting device is covered with the transparent conductive film with the amorphous local upheaval generated on the transparent conductive film of polycrystal. Moreover, granular growth does not arise and the amorphous transparent conductive film serves as a uniform and flat film surface.
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of a dark spot resulting from local upheaval of an anode plate 12.
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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the simple block diagram of an organic light emitting device showing 1 operation gestalt of this invention.
[Drawing 2] It is the simplified schematic showing the anode plate configuration with which the above-mentioned organic light emitting device was equipped.
[Drawing 3] It is the simple block diagram of the organic light emitting device shown as a conventional example.
[Drawing 4] It is the simple block diagram of the same organic light emitting device as drawing 3 which is not equipped with an electronic transportation layer.
[Drawing 5] It is the simple block diagram of the same organic light emitting device as drawing 3 which is not equipped with an electron hole transportation layer.
[Drawing 6] It is the simple block diagram of the same organic light emitting device as drawing 3 which is not equipped with an electron hole transportation layer and an electronic transportation layer.
[Drawing 7] It is the simplified schematic having shown the anode plate configuration of the organic light emitting device shown as a conventional example.
[Description of Notations]
11 Glass Substrate
12 Anode Plate
12a Transparent conductive film of polycrystal
12b Amorphous transparent conductive film
13 Electron Hole Transportation Layer
14 Luminous Layer
15 Electronic Transportation Layer
16 Cathode

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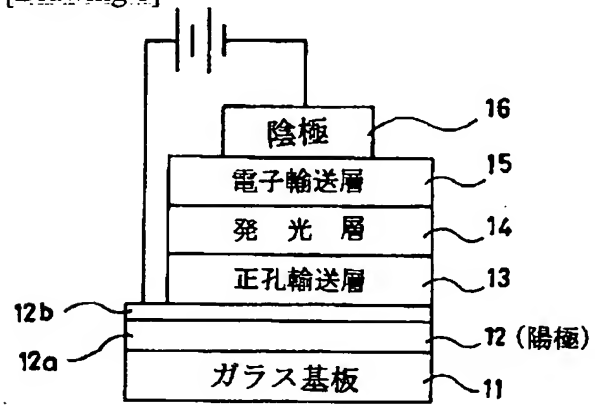
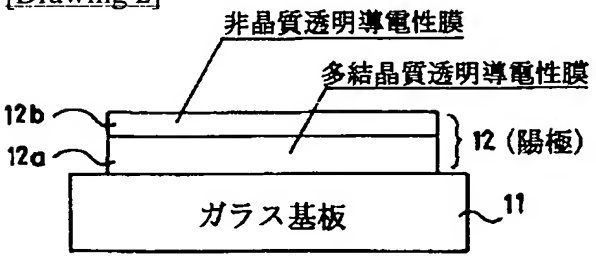
DRAWINGS

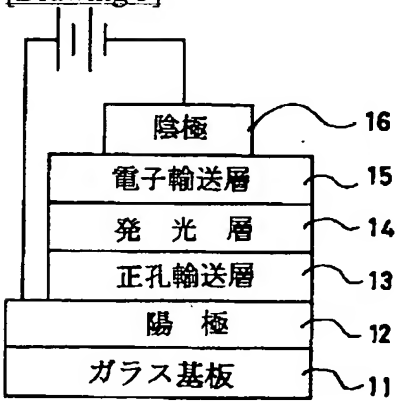
[Drawing 1]



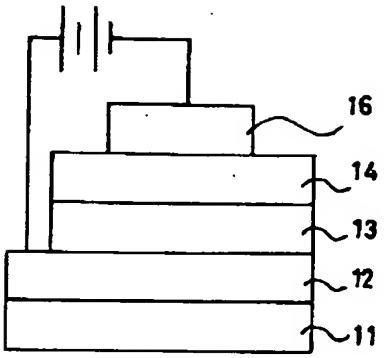
[Drawing 2]



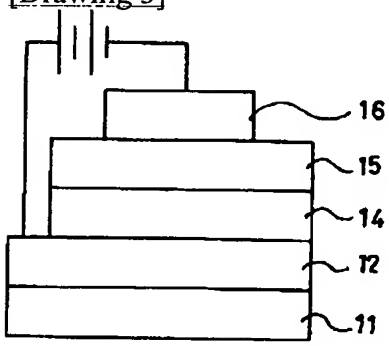
[Drawing 3]



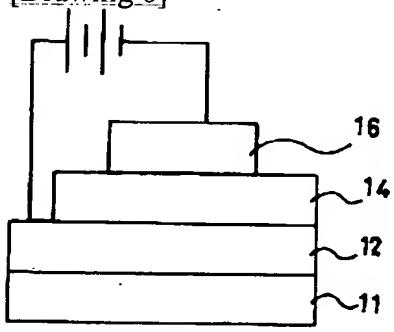
[Drawing 4]



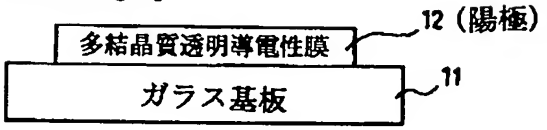
[Drawing 5]



[Drawing 6]



[Drawing 7]



[Translation done.]

(19)日本国特許庁（ＪＰ）　(12)公開特許公報（Ａ）　(11)特許出願公開番号
特開2002－100483
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(43)公開日　平成14年４月５日(2002.4.5)

(51)Int.Cl.'	識別記号	ＦＩ		テーマコード'(参考)
Ｈ０５Ｂ　33/28		Ｈ０５Ｂ　33/28		３Ｋ００７
33/14		33/14	Ａ	

審査請求　未請求　請求項の数１　ＯＬ　（全　４　頁）

(21)出願番号　特願2000－288235(P2000－288235)

(22)出願日　平成12年９月22日(2000.9.22)

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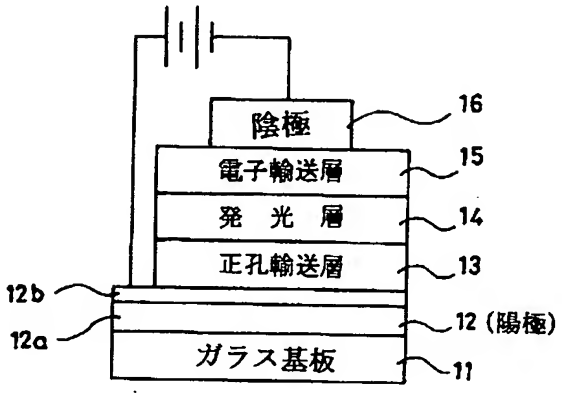
(74)代理人　100076196
弁理士　小池　寛治

Ｆターム(参考)　3K007 AB00 AB05 CA01 CA05 CB01
CB04 DA00 DB03 EB00 FA01

(54)【発明の名称】　有機発光素子

(57)【要約】
【課題】　陽極の透明導電性膜の局部隆起によって起因するショートやダークスポットなどの問題を解決した有機発光素子を提供すること。
【解決手段】　ガラス基板１１の面上に、多結晶質の透明導電性膜１２ａを、その上に非晶質の透明導電性膜１２ｂを各々膜形成した２層構成の陽極１２を備えた有機発光素子となっている。



【特許請求の範囲】

【請求項１】　透明基板面に成膜形成した透明の陽極と、この陽極膜の上に堆積させた有機層と、この有機層の上に成膜形成した陰極とからなる有機発光素子において、

透明基板面に多結晶質の透明導電性膜を、その上に非晶質の透明導電性膜を各々膜形成した２層構成の陽極を備えたことを特徴とする有機発光素子。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】この発明は、有機材からなる発光層を備えた有機発光素子に関する。

【０００２】

【従来の技術】図３は有機発光素子の一例を示す簡略構成図である。図示するように、この有機発光素子は、陽極１２を膜形成した透明なガラス基板１１の上に、正孔輸送層１３、発光層１４、電子輸送層１５を順次膜形成し、さらに、電子輸送層１５に陰極１６を膜形成した構造となっている。なお、ガラス基板１１は、透明なプラスチック材で形成されたものがある。

【０００３】陽極１２は、仕事関数の大きい金属や合金によって形成されている。具体的には、ＩＴＯ（インジウムースズの酸化物）、SnO_2（酸化スズ）、ＺｎＯ（酸化亜鉛）などを使って形成した多結晶質の透明導電性膜となっている。

【０００４】また、正孔輸送層１３、発光層１４、電子輸送層１５は有機材（有機化合物）によって膜形成されている。具体的には、Alq_3（アルミキレート錯体）、ＴＰＤ（芳香族ジアミン）によって代表される低分子系材やＰＰＶ（ポリフェニレンビニレン）誘導体によって代表される高分子系材が使用されている。

【０００５】上記陰極１６は、仕事関係の小さい金属や合金、または、これら金属や合金の混合物によって形成されている。具体的には、Ｃａ（カルシウム）、Ａｌ（アルミニウム）、Ａｌ－Ｌｉ（リチウム）合金、Ｍｇ（マグネシウム）－Ａｇ（銀）合金、Ｍｇ－Ａｌ合金、Ｍｇ－Ｉｎ（インジウム）合金などを蒸着やスパッタリングなどの方法によって薄膜形成した陰極となっている。

【０００６】上記した有機発光素子は、陽極１２と陰極１６とに直流電圧を印加することにより、陽極１２より注入される正孔が正孔輸送層１３を経て発光層１４に送られる。また、陰極１６より注入される電子が電子輸送層１５を経て発光層１４に送られる。発光層１４では正孔と電子とが再結合し、これによって発光層１４の有機材が励起状態となり励起子が生成する。

【０００７】このように生成した励起子は発光層１４内を拡散し、続いてその基底状態へと脱励起され、その時に発光し、この発光が正孔輸送層１３、陽極１２、ガラス基板１１を通って射出される。

【０００８】図４は、発光層１４が電子輸送層１５を兼ねるように構成された有機発光素子の簡略構成図である。この発光素子は、ガラス基板１１に陽極１２を膜形成し、その上に、正孔輸送層１３と発光層１４が積層されており、陰極１６が発光層１４に膜形成されている。

【０００９】図５は、発光層１４が正孔輸送層１３を兼ねる有機発光素子の簡略構成図である。この発光素子は、ガラス基板１１に陽極１２を膜形成し、その上に発光層１４と電子輸送層１５とが積層されており、陰極１６が電子輸送層１５に膜形成されている。

【００１０】図６は、正孔輸送層１３と電子輸送層１５を備えない有機発光素子の簡略構成図である。この発光素子は、ガラス基板１１に陽極１２を膜形成し、その上に発光層１４が積層されており、陰極１６が発光層１４に膜形成されている。

【００１１】図４、図５、図６に示す有機発光素子は、図３に示した有機発光素子と同様に陽極１２と陰極１６とに直流電圧を印加することにより発光し、この発光が陽極１２とガラス基板１１を通って射出する。

【００１２】上記した従来の有機発光素子の発光色は、発光層１４の有機材に依存するところが大きい。現在では、緑色、黄色、橙色、赤色、青色の発光色の有機発光素子が実用化され、また、提案されている。

【００１３】

【発明が解決しようとする課題】上記した有機発光素子の陽極１２は、図７に示すようにガラス基板１１の面上に多結晶質の透明導電性膜を真空成膜またはウエットプロセスによって成膜後、電極形状にパターニングして薄膜形成されている。

【００１４】したがって、陽極１２を多結晶質のＩＴＯを用いて成膜形成する場合、膜形成過程で結晶粒（グレイン）の部分的成長が生じ、膜面上に結晶の局部隆起（不規則配置の多数の突状部）が生じる。

【００１５】この局部隆起は大きさ（高さ）が１５００Å以上にもなるため、陽極１２上に堆積させる有機層（正孔輸送層或いは発光層）を突き破るようになる。このため、発光素子にショートやダークスポット（非発光部）成長に起因した欠陥が生じる。

【００１６】また、有機層を厚く形成し、陽極１２上の局部隆起を被い尽くそうとすると、有機発光素子の発光開始電圧が上昇するため、発光素子特性が低下すると言う問題が生じる。

【００１７】本発明は上記した実情にかんがみ、陽極の導電性膜の局部隆起によって発生するショートやダークスポットなどの問題を解決した有機発光素子を提案することを目的とする。

【００１８】

【課題を解決するための手段】上記した目的を達成するため、本発明では、透明基板面に成膜形成した透明の陽極と、この陽極膜の上に堆積させた有機層と、この有機

層の上に成膜形成した陰極とからなる有機発光素子に関する。

【００１９】そして、この発明の有機発光素子は、透明基板面に多結晶質の透明導電性膜を、その上に非晶質の透明導電性膜を各々膜形成した２層構成の陽極を備えたことが特徴となっている。

【００２０】

【作用】このように構成した有機発光素子の陽極は、多結晶質の透明導電性膜に発生した局部隆起が非晶質の透明導電性膜によって被われる。また、非晶質の透明導電性膜は粒状成長が生じなく均一で平坦な膜面となる。

【００２１】この結果、陽極膜の上に堆積する有機層が非晶質の透明導電性膜上に成膜されることから、有機層が陽極膜に生ずる粒状の局部隆起によって突き破られることがない。このことから、陽極膜の局部隆起に起因するショートやダークスポットのない有機発光素子となる。

【００２２】

【発明の実施の形態】次に、本発明の一実施形態について図面に沿って説明する。図１は、本実施形態の有機発光素子を示す簡略構成図である。図示するように、この有機発光素子は陽極構成の他は図３に示す従来例の有機発光素子と同構成となっている。

【００２３】そして、本実施形態では、図２に示した如く、透明なガラス基板（または、透明なプラスチック基板）１１の面上に陽極第１層として多結晶質の透明導電性膜１２ａを成膜形成し、さらに、陽極第２層として非晶質の透明導電性膜１２ｂを成膜形成し、これら２層構成の透明導電性膜１２ａ、１２ｂによって陽極１２が構成してある。

【００２４】また、多結晶質の透明導電性膜１２ａはＩＴＯ材を使用して１０００Åに薄膜形成し、また、非晶質の透明導電性膜１２ｂはＩＸＯ（出光興産株式会社の商品名）を使用して５００Å～１０００Å堆積して膜形成してある。ＩＸＯはIn_2O_3－ＺｎＯ系アモルファス透明導電材である。

【００２５】なお、これら透明導電性膜１２ａ、１２ｂは真空成膜またはウエットプロセスによって成膜後、電極形状にパターニングする。

【００２６】上記のように形成した陽極１２は、膜形成工程において透明導電性膜１２ａに発生する局部隆起が透明導電性膜１２ｂによって被われるため、陽極１２の表面が透明導電性膜１２ｂによる均一な平坦膜面となる。

【００２７】したがって、正孔輸送層１３を非晶質の透明導電性膜１２ｂの平坦膜面に堆積させることができることから、正孔輸送層１３に突き破り部所が生じない。

【００２８】このように、比抵抗の小さい多結晶質の透明導電性膜１２ａと、この透明導電性膜１２ａより比抵抗が大きいが局部隆起を生じない非晶質の透明導電性膜１２ｂとの長所を利用して構成した陽極１２を備えたことから、陽極１２の局部隆起に起因するショートやダークスポットの発生のない有機発光素子となる。

【００２９】以上、本発明の一実施形態について説明したが、透明導電性膜１２ａはＩＴＯ材の他ＺｎＯ材、SnO_2材などで形成することができ、また、透明導電性膜１２ｂはＩＸＯにかぎらず同様の非晶質材で形成することができる。

【００３０】さらに、上記した実施形態の陽極１２は、図４、図５、図６に従来例として示した有機発光素子についても同様に実施することができる。

【００３１】

【発明の効果】上記した通り、本発明の有機発光素子は、多結晶質の透明導電性膜と非晶質の透明導電性膜とで２層膜構成とした陽極を備えたことから、ショートやダークスポットのない良質な有機発光素子となる。

【図面の簡単な説明】

【図１】本発明の一実施形態を示す有機発光素子の簡略構成図である。

【図２】上記有機発光素子に備えた陽極構成を示す簡略図である。

【図３】従来例として示した有機発光素子の簡略構成図である。

【図４】電子輸送層を備えない図３同様の有機発光素子の簡略構成図である。

【図５】正孔輸送層を備えない図３同様の有機発光素子の簡略構成図である。

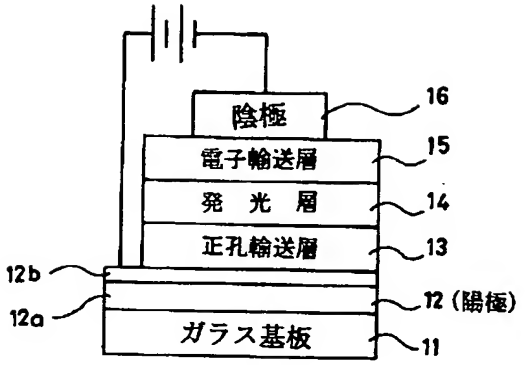
【図６】正孔輸送層と電子輸送層とを備えない図３同様の有機発光素子の簡略構成図である。

【図７】従来例として示した有機発光素子の陽極構成を示した簡略図である。

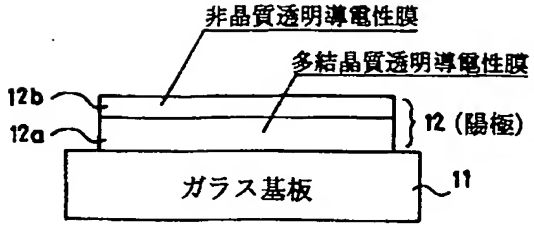
【符号の説明】

１１　ガラス基板
１２　陽極
１２ａ　多結晶質の透明導電性膜
１２ｂ　非晶質の透明導電性膜
１３　正孔輸送層
１４　発光層
１５　電子輸送層
１６　陰極

【図１】



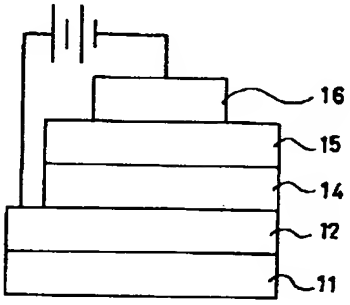
【図２】

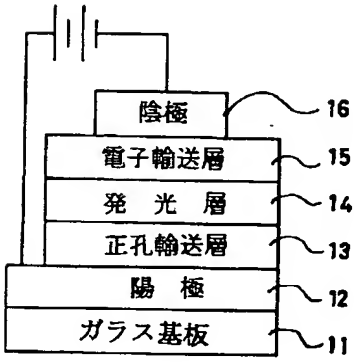


【図３】

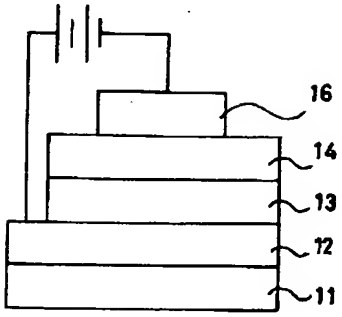
【図４】

【図５】





【図６】



【図７】